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# Two new species of *Gulella* (Mollusca: Pulmonata: Streptaxidae) from the Taita Hills, Kenya

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## ABSTRACT

The streptaxid land-snails *Gulella ndiwenyiensis* sp. n. and *G. nictitans* sp. n. are described as narrow-range endemics from indigenous forest remnants in the Taita Hills, Kenya. The conservation needs of these species are likely to be similar to another Taita endemic streptaxid, *Gulella taitensis* Verdcourt, which has been assessed as meeting the IUCN criteria for *Critically Endangered* category. On shell morphology, one of the new species can be assigned to a morpho-group of others which appears to extend from eastern Kenya to eastern South Africa, while the other most closely resembles other tropical, mainly eastern, African species. We introduce data on aspects of the soft anatomy in the hope that these groupings may be tested when other taxa are investigated more thoroughly.

KEY WORDS: Mollusca, Streptaxidae, *Gulella*, Africa, Kenya, Taita Hills, new species, endemics, conservation.

## INTRODUCTION

Streptaxid snails are currently recognised as the most speciose element in the land mollusc fauna of indigenous forests in the Eastern Arc Mountains of East Africa, displaying a high rate of endemism (Tattersfield *et al*. 1998). Forest fragments in the Taita Hills of south-east Kenya, the most northerly range in the Eastern Arc, have only recently become the target of intensive mollusc sampling, having been neglected since the late 19th century (Lange 2006; Verdcourt 1963). Fieldwork conducted by one of us (CNL) brought to light two new species of streptaxids, which we describe here. We briefly discuss their phylogenetic and biogeographical affinities based mainly on our interpretation of shell morphology, but also include details on the soft anatomy in the hope that these predictions may be tested in future.

The flora and fauna of the Taita Hills forests have attracted attention for their high diversity, substantial endemism, and high levels of endangerment across a wide range of taxa (e.g. Bennun & Njoroge 1999; Bytebier 2001). Biogeographic affinities have been identified between the Taita Hills and the Tanzanian ranges of the Eastern Arc (e.g. Verdcourt 1963), the geologically younger Kenyan Highlands (e.g. Brooks *et al*. 1998; Lange *et al*. 1998), and South Africa (e.g. Dall'Asta 2004). We expect both the new *Gulella* species to be narrow-range endemics restricted to their respective forest fragments in the Taita Hills. Neither surveys with similar methodologies nor incidental collecting in many other forests in Kenya and Tanzania have recorded these species (e.g. Seddon *et al*. 2005; Verdcourt 2006). Until now, three endemic land-snail species were known from the Taita forests: *Thapsia buraensis* Verdcourt, 1982 (Urocyclidae), *Zingis radiolata* von Martens, 1878 (Urocyclidae), and *Gulella taitensis* Verdcourt, 1963 (Streptaxidae) (Tattersfield *et al*. 1998). All three are presently listed as *Endangered* by the IUCN Red List (IUCN 2006), while Lange (2006) showed that *G. taitensis* met the requirements for the *Critically Endangered* category. We suggest that the conservation needs of the new streptaxids are likely to be broadly similar to those of *G. taitensis*, with which they share the indigenous forest leaf-litter habitat. Lange (2006) concluded that, despite occurring in six of the nine Taita forest fragments surveyed, *G. taitensis* will probably avoid extinction only with increased conservation effort and legislation. Each of the new species is known from only four of the nine fragments surveyed. We therefore seek to apply to IUCN upon publication to include the new species in the Red List, on the basis outlined by Lange (2006).

## MATERIAL AND METHODS

Fieldwork was conducted in nine of the twelve remaining forest fragments in the Taita Hills between July and December 2000 (Mbololo, Ngangao, Yale, Vuria, Fururu, Macha, Ndiwenyi, Kichuchenyi, and Chawia). Snails were searched for directly in forest floor litter, around dead wood, and in moss mats on tree trunks. The amount of collecting effort (number of hours spent searching) varied according to the size of the forest habitat but was 110 hours in total (details in Lange 2006).

All the type specimens referred to here are adult shells containing animals that were drowned in water for 12 hours and preserved in 80% ethanol at ambient temperature. Tissue pieces (tails) have been removed from some types to attempt DNA extraction. Specimens were dissected in 2006 in 80% ethanol under a stereomicroscope with camera lucida. Shells of dissected individuals were photographed and/or drawn before dissection, or afterwards if the extended animal obscured parts of the shell. Animals were removed from shells causing as little damage as possible to either the body or the shell, although in several cases the shell had to be broken. Samples of chitinous penis hooks were transferred to 96% ethanol, cleared, mounted on glass slides using Euparal™ and examined with a compound microscope. A number of non-type specimens are also referred to here; because these have not been examined by both authors, they have been excluded from the type series.

The following acronyms are used in the text:

NMK – National Museums of Kenya, Nairobi, Kenya;
NMT – National Museums of Tanzania, Dar es Salaam, Tanzania;
NMW – National Museum of Wales, Cardiff, UK.

## TAXONOMY

### Genus *Gulella* L. Pfeiffer, 1856

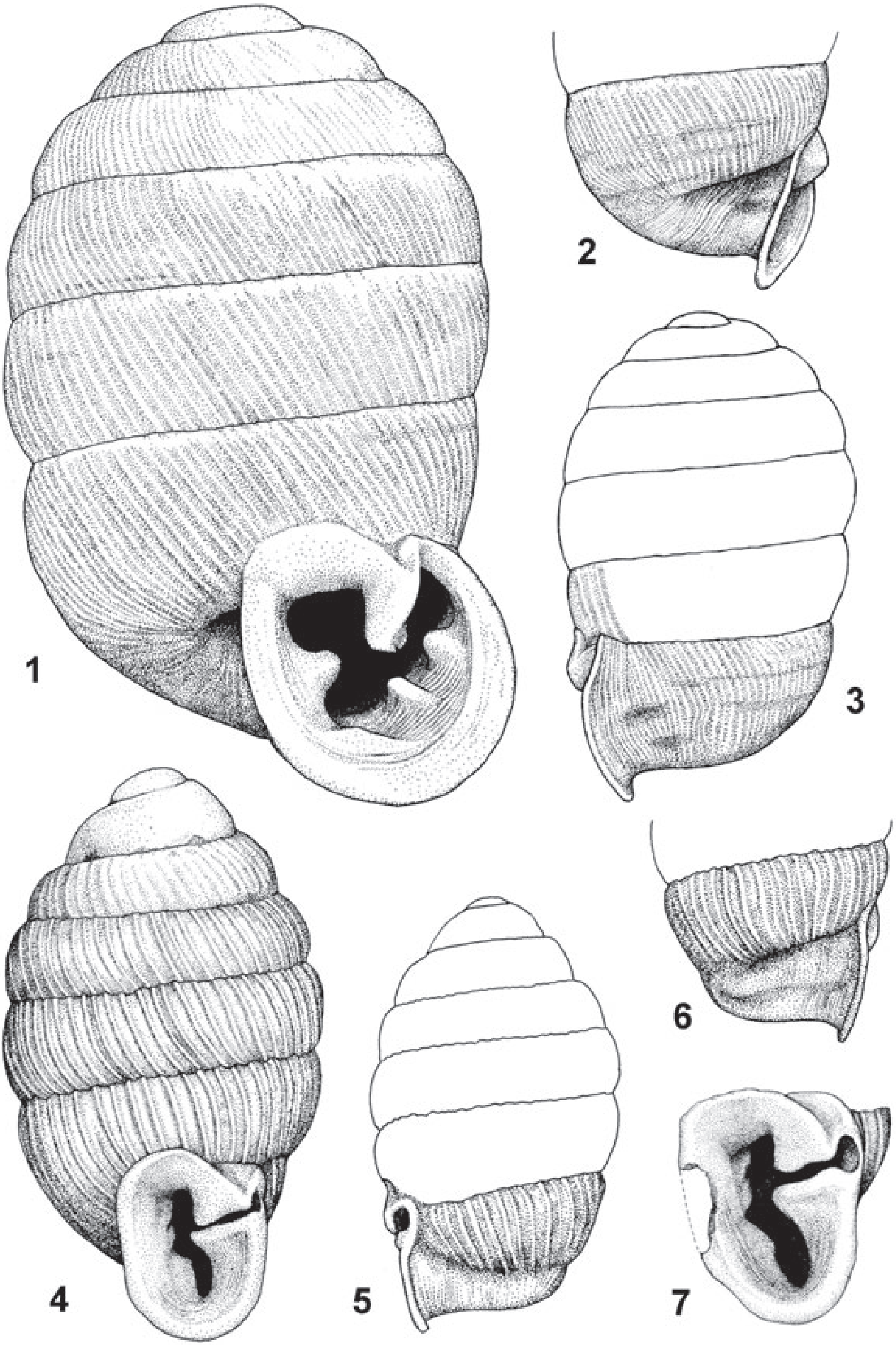
### **Gulella ndiwenyiensis** sp. n.

Figs 1–3, 8–13

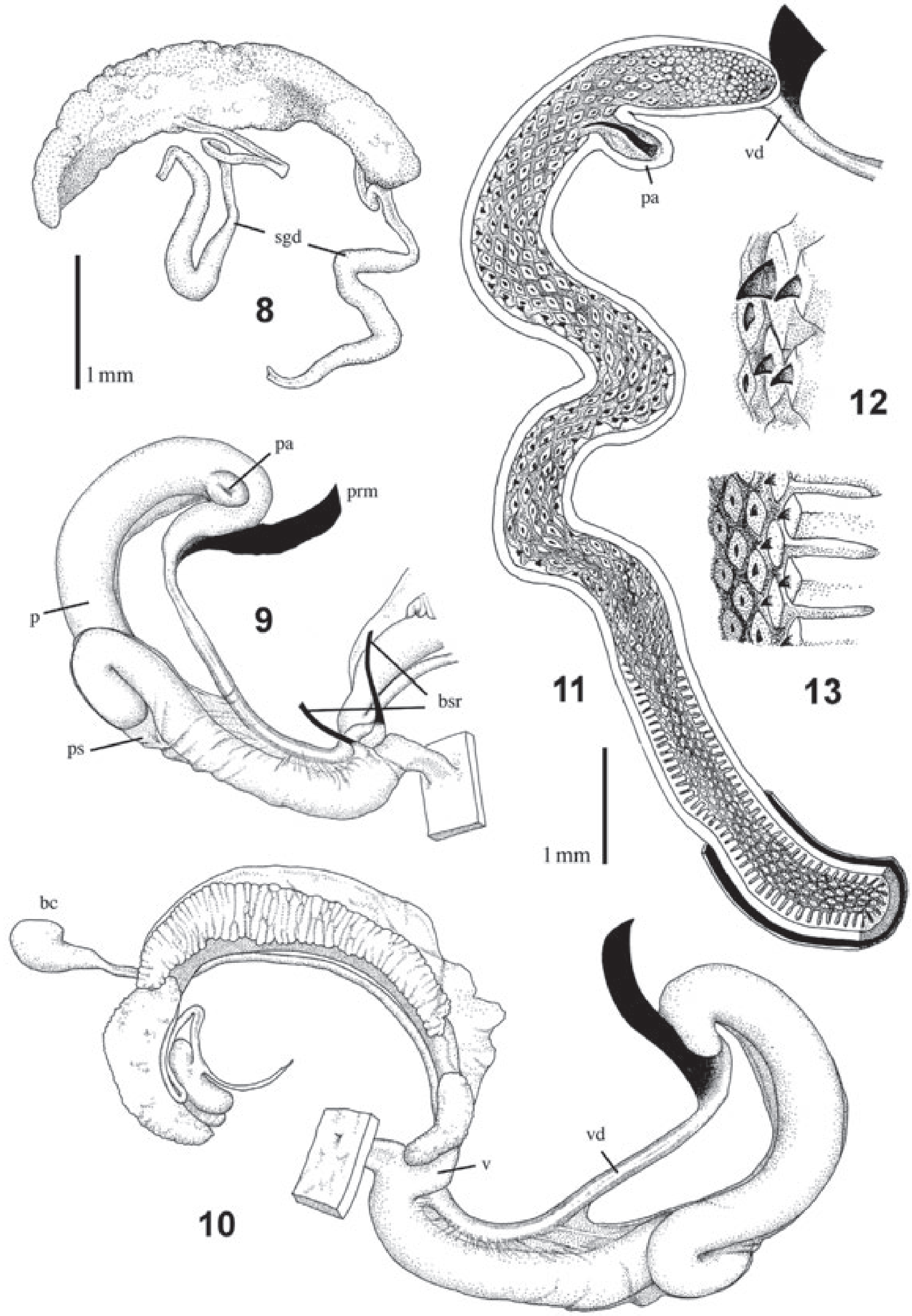
Etymology: From the type locality, Ndiwenyi Forest Reserve.

Diagnosis: Shell medium-sized for the genus, distinctively ovate-barrel-shaped; sculptured with oblique axial ribs; peristome complete, apertural dentition five-fold: a strong, slightly sinuous parietal lamella, two palatal processes, a basal process and a strong columellar tooth; embryonic shell finely granular; umbilicus open, deep.

Description: Adult shell (Figs 1–3) medium-sized for the genus (height 4.7–5.3 mm, width 2.7–3.3 mm), and ovate-barrel-shaped, of 6.25 to 6.75 whorls. Intraspecific variation in shell shape moderate. Penultimate whorl and body whorl together comprise about 68% of total shell height. Aperture (including peristome) comprises about 36%



Figs 1–7. New *Gulella* species from Kenya: (1–3) *G. ndiwenyiensis* sp. n., holotype shell, length 4.9 mm; (4–7) *G. nictitans* sp. n.: (4–6) holotype shell (length 3.8 mm), (7) aperture of paratype 1.



Figs 8–13. *Gulella ndiwenyiensis* sp. n., anatomy of paratype 1: (8) salivary gland from columellar side; (9) penis from ventral side; (10) genitalia from dorsal side; (11) penis opened from dorsal side; (12, 13) views of interior surface of penis, greatly enlarged. Abbreviations: bc – bursa copulatrix, bsr – basal sheath retractor muscle, p – penis, pa – penial appendix, prm – penial retractor muscle, ps – penial sheath, sgd – salivary gland duct, v – vagina, vd – vas deferens.

of total shell height. Peristome complete, thickened and reflected and flaring, particularly in palatal and basal part. Body whorl only slightly constricted adjacent to the aperture. Umbilicus open, wide, and tubular; columella relatively straight. Apertural dentition moderately developed, consistently with five processes as follows: (1) a large, thick, slightly sinuous and deeply entering parietal lamella projecting outwards a short distance from the body whorl and corresponding to an outwardly and palatally directed V-shaped depression in the parietal callus; (2) a small, rounded, boss-like upper palatal tooth, in some specimens taking the form of a rounded, very short lamella shallowly entering; (3) a small, rounded, short lower palatal lamella shallowly entering; (4) a small, slight, narrow, transverse basal lamella set closer to the outside of the aperture than the other teeth; and (5) a moderate, rounded, boss-like columellar tooth. Resulting apertural dentition formula *sensu* Verdcourt (1962) is 1; 2; 1; 1. Parieto-palatal sinus wide, simple. Parietal callus moderately thick and clearly distinct from body whorl. Outer palatal wall with two, relatively slight, excisions corresponding to the palatal teeth. Outer columellar wall with a relatively slight excision corresponding to the columellar tooth. No sign of juvenile dentition in the single juvenile specimen (paratype 3) or inside the shells of dissected adults. Shell colourless and glassy, dirty white when corroded, with no obvious periostracum. Shell surface as follows: embryonic whorls smoothly, irregularly granular with very faint and irregular spiral scratches under a light microscope (60× magnification). Later whorls with major sculpture of oblique, straight, regular axial ribs which, though distinct, do not have sharp edges where they contact the shell surface and thus appear slightly smoothed. On the holotype, these ribs occur at a density of about 8 per mm (penultimate whorl), about 9 per mm (body whorl), and increase in density while decreasing in size towards the aperture on the last half of the body whorl, where they also become less regular and in some cases slightly sinuous. On the later whorls of some specimens, including the holotype, the ribs are interrupted by 1–3 very irregular spiral depressions, each about the width of one of the largest ribs and continuing for irregular distances around the whorls.

*Body colour*: Alcohol-preserved specimens are nearly unicolorous tan-cream, without differently coloured tentacles, patterning on the mantle, etc. The digestive gland is tan-brown in colour.

*Salivary gland* (Fig. 8): Single, 2.75 mm long, not folded, fragile, bicolorous (cream with white regions surrounding entry of both salivary ducts). Anterior duct exiting gland subapically; posterior duct exiting just posterior to the midpoint of gland. Both salivary ducts substantially thickened and rounded prior to point of entry into buccal mass, becoming narrower and flattened at point of entry.

*Genitalia* (Figs 9–13): Penis notably long (6.40 mm when straightened, or 0.75 whorls when bent) and further lengthened by running in a single, complete, tight loop just proximal to the midpoint. Penis with a short, bud-like penial appendix very apically. Whole of penis and distal part of vas deferens enclosed in a thin, slightly wrinkled, elastic, transparent sheath, this sheath enclosing the complete loop in the penis in a straight path rather than following the penis' path through the loop. Sheath perhaps contiguous with penis wall at both apical and basal ends of the penis, but this is difficult to determine by dissection alone. Sheath with two short basal retractor muscles, originating from the body wall. Vas deferens flattened, uniformly thick throughout its length,

TABLE 1

Data on types of *G. ndiwenyiensis* sp. n. All specimens are live-collected adults except where noted. Abbreviations: Ht – holotype, Pt – paratype, Acc. no. – accession number including museum acronym, H – height, W – width.

| **Status** | **Acc. no.** | **H (mm)** | **W (mm)** | **Whorls** | **Notes** |
|---|---|---|---|---|---|
| Ht | NMK | 4.9 | 5.0 | 6.5 | |
| Pt 1 | NMW.Z.2007.024.00001 | 5.0 | 3.1 | 6.75 | Dissected |
| Pt 2 | NMW.Z. 2007.024.00002 | 5.0 | 3.0 | 6.25 | Dissected |
| Pt 3 | NMW.Z. 2007.024.00003 | 1.8 | 2.7 | 3.25 | Juvenile |
| Pt 4 | NMW.Z.2007.024.00004 | 5.3 | 3.1 | 6.75 | |
| Pt 5 | NMW.Z. 2007.024.00005 | 5.0 | 3.3 | 6.5 | |
| Pt 6 | NMW.Z.2007.024.00006 | 4.9 | 3.0 | 6.25 | |
| Pt 7 | NMT | 4.9 | 3.0 | 6.5 | |
| Pt 8 | NMT | 4.7 | 3.0 | 6.25 | |
| Pt 9 | NMK | 4.8 | 3.2 | 6.5 | |
| Pt 10 | NMK | 4.8 | 3.1 | 6.5 | |
| Pt 11 | NMK | 4.9 | 3.1 | 6.5 | |
| Pt 12 | NMK | 5.0 | 3.1 | 6.5 | |
| Pt 13 | NMK | 4.8 | 3.0 | 6.5 | Empty subadult shell, corroded |

with lumen clearly visible from outside, entering penis apically, with thick penial retractor muscle attaching to both penis and vas deferens around the entry point. Penial retractor originating from the free muscle system and not from the body wall. Interior surface of penis (Fig. 11) consisting mainly of serially repeating prism-shaped pads bearing chitinous spines or hooks as follows. Apical part of penis: small, rounded, flat, scale-like pads, most bearing single, minute, simple yellow-brown triangular hooks (about 0.05 mm long). Penial appendix: without hooks but containing a single, very large (0.60 mm long), curved red-brown spine, slightly sinuous in one plane, attached firmly to end wall of appendix with its point projecting a short distance into main lumen of penis. Middle part of penis, incorporating loop: larger, irregular, raised prism-shaped pads, most bearing single, slightly recurved and slightly blunted yellow-brown triangular hooks, which vary little in length (about 0.03 mm long). Basal part of penis: more regular, evenly spaced, uniform, elongate-columnar prismatic pads projecting into the lumen, each bearing single, minute, simple yellow-brown triangular hooks (about 0.02 mm long), this pattern continuing as far as the entry of the penis into the atrium. Total number of hooks in penis: about 300. Albumen gland moderately sized and with a uniform structure of small and indistinct vesicles or acini. Hermaphroditic duct diverticulum (talon) enlarged, but compact and convoluted, not hidden within albumen gland. Bursa copulatrix (= gametolytic sac or spermatheca) oval, apparently empty, and attending albumen gland. Acini of oviductal gland elongate, flattened, distinct and relatively large. Acini of prostate small and indistinct. Oviparous or ovoviviparous (oviduct of paratype 2 contains a single, large, rounded-reniform egg with soft membrane containing calcite crystals and without obvious internal structures). Walls of oviduct thin, stretching to accommodate the egg in paratype 2 and folded, collapsed and slightly torn in paratype 1, which we presume to have recently laid an egg. Vagina and atrium short, little muscularised.

Holotype: KENYA: Taita Hills, Ndiwenyi Forest Reserve (3°26'S:38°21'E), leaf litter in indigenous forest at 1580 m altitude, leg. C.N. Lange, 26.ix.1998 (NMK).

Paratypes: Collection data for all paratypes same as holotype; all specimens except paratype 3 and paratype 13 are live-collected adults (Table 1).

Other material examined: 31 additional specimens, as follows: KENYA: Taita Hills: 1 adult, Ndiwenyi Forest Reserve (3°26'S:38°21'E), leaf litter in indigenous forest at 1580 m altitude, leg. C.N. Lange, 26.ix.1998; 2 adults, Mbololo Forest Reserve (3°20'S:38°26'E), leaf litter in indigenous forest at 1800–2200 m altitude, leg. C.N. Lange, 1.x.1998; 15 adults, Macha Forest Reserve (3°27'S:38°22'E), leaf litter in indigenous forest at 1550 m altitude, leg. C.N. Lange, 27.ix.1998; 13 adults, Kichuchenyi Forest Reserve (3°25'S:38°21'E), leaf litter in indigenous forest at 1450 m altitude, leg. C.N. Lange, 28.ix.1998 (NMK).

Remarks: We consider this species readily distinguishable from all other East African *Gulella* by the combination of macroscopic shell characters. The general features of the shell, including the five-fold apertural dentition, strongly suggest inclusion in *Gulella* L. Pfeiffer, 1856 *s.l.* rather than any other genus as currently recognised. However, new streptaxid species from Africa and associated islands continue to be attributed to the genus *Gulella* while it is widely acknowledged that the taxonomy of the genus is unsatisfactory (e.g. Schileyko 2000). Subgenera and sections are currently of limited value and we refrain from assigning *G. ndiwenyiensis* to any of these, although we do not believe that this species represents a new group. We also consider that although Schileyko (2000) and others have erected subfamilies of the Streptaxidae that take into account shell and other characters, it is likely that *Gulella s.l.* may prove heterogenous enough to challenge these classifications. Therefore we do not at this point assign this species to any subfamily.

The presence and nature of the penial appendix and interior penial hooks resemble in some respects members of the subgenus (or section) *Primigulella* Pilsbry, 1919 (data tabulated by Verdcourt 1990) although the general form of the shell is substantially different. A penial appendix containing a spine, as opposed to a massive hook, is a feature of certain other East African streptaxids, including edentate, much larger species in the genus *Gonaxis* Taylor, 1877 *s.l.* (BR unpublished data). It does not, however, closely resemble the appendix of any of the West African species illustrated by Degner (1934) or those for which data are available from other regions. We therefore tentatively conclude that the nearest extant relatives of *G. ndiwenyiensis* are East African. The presence of this feature in groups with very dissimilar shells suggests that, whether homologous or not, further systematic work is required to understand its evolutionary significance and importance in biogeography.

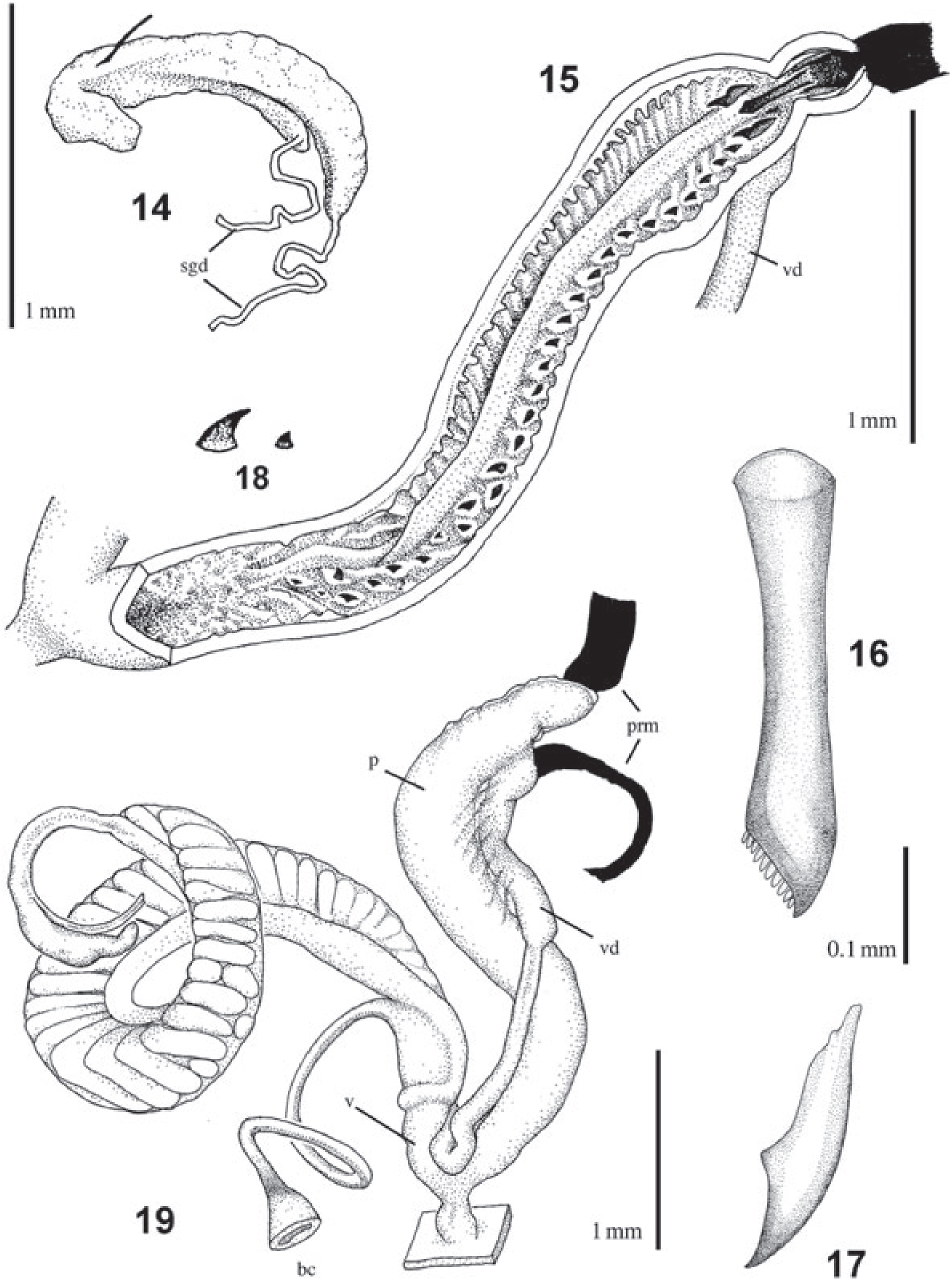
## **Gulella nictitans** sp. n.

Figs 4–7, 14–19

Etymology: From Latin *nictitans* (winking); with reference to the parieto-palatal sinus that recalls a closed eye.

Diagnosis: Shell small for the genus, distinctively ovate-biconical; sculptured with strong axial ribs; peristome complete, apertural dentition distinctive, arguably five-fold: a strong, palatally directed parietal lamella meeting a large palatal slab, the two almost meeting along a narrow parieto-palatal sinus, the other dentition consisting of three folds on the columella; embryonic shell finely granular; umbilicus closed.

Description: Adult shell (Figs 4–7) small for the genus (height 3.6–3.9 mm, width 2.0–2.2 mm), and ovate-biconical, of 5.5 whorls. Spire more conical than most other *Gulella*.


14
sgd
1 mm
15
vd
1 mm
18
16
0.1 mm
prm
p
vd
v
19
bc
1 mm
17

Figs 14–19. *Gulella nictitans* sp. n., anatomy of paratype 2: (14) salivary gland from columellar side; (15) penis opened dorsally; (16–18) hooks from penis; (19) genitalia from dorsal side. Abbreviations: bc – bursa copulatrix, p – penis, prm – penial retractor muscle, sgd – salivary gland duct, v – vagina, vd – vas deferens.

Shell shape varies a little intraspecifically but other shell features almost constant. Penultimate whorl and body whorl together comprise about 67% of total shell height. Aperture (including peristome) comprises about 34% of total shell height. Peristome complete, thickened and reflected and flaring. Body whorl strongly constricted adjacent to the aperture, especially along the excision corresponding to the palatal slab, such that the palatal side of the body whorl is divided into two regions. Columella relatively straight but body whorl occludes any umbilicus, the visible suture being the junction of the body whorl and penultimate whorl. Apertural dentition well-developed, occluding much of the aperture, and consistently with five processes, although the three columellar processes are little more than folds on the columella and so the dentition could be considered less than five-fold. Apertural processes are as follows: (1) a large, thick, palatally directed and deeply entering parietal lamella projecting outwards a very short distance from the body whorl and corresponding to an outwardly and palatally directed V-shaped depression in the parietal callus; (2) a strong, slab-like palatal process, curved inwardly on the columellar side and nearly straight along its upper margin, and corresponding to a very long and deep excision on the palatal side of the body whorl; and (3–5) three slight, simple, and deeply set folds on the columella, the two upper folds being much smaller than the basal one. Resulting apertural dentition formula *sensu* Verdcourt (1962) can be given as 1; 1; 0; 3, or alternatively 1; 1; 0; 1(3). Parieto-palatal sinus narrow, tubular and directed palatally at an angle of 75–90° from the columella, almost closed in front by the near-meeting of the margins of the parietal lamella and palatal slab along a straight line, resulting in a conspicuous narrow slit. Parietal callus thick and clearly distinct from body whorl, being separated from it by a detectable groove. Outer columellar wall with a slight but long excision corresponding to the lowermost columellar fold. No sign of juvenile dentition in the single juvenile specimen (paratype 9) or inside the shells of dissected adults. Shell colourless and glassy, dirty white when corroded, with no obvious periostracum. Shell surface as follows: embryonic whorls smoothly, irregularly granular under a light microscope (60× magnification). Later whorls with major sculpture of strong, oblique, straight or slightly sinuous, regular axial ribs with sharply defined edges, interstices between ribs nearly smooth. On the holotype, ribs occur at a density of about 13 per mm (penultimate whorl) and about 12 per mm (body whorl). On palatal side of body whorl, ribs continue only as far as the long excision corresponding to the palatal slab, being replaced by much finer, irregular ribs beneath the excision. Finer, irregular ribs also replace the major axial ribs on the columellar side of the body whorl.

*Body colour*: Alcohol-preserved specimens are unicolorous pale cream, without differently coloured tentacles, patterning on the mantle, etc.

*Salivary gland* (Fig. 14): Single, 1.2 mm long, fragile, distinctively Y-shaped, with anterior portion of posterior half of gland produced anteriorly. Anterior duct exiting gland apically; posterior duct exiting from the apex of the posterior half of gland. Both salivary ducts evenly narrow throughout their length.

*Genitalia* (Figs 15–19): Penis rather long (3.25 mm when straightened or 1.5 whorls when bent) without appendices. Apical part of vas deferens bound to penis by an extremely thin, transparent sheath contiguous with wall of penis basally. Vas deferens substantially thickened distally, entering penis subapically, with penial retractor muscle

TABLE 2

Data on types of *G. nictitans* sp. n. All specimens are live-collected adults except where noted. Abbreviations: Ht – holotype, Pt – paratype, Acc. no. – accession number including museum acronym, H – height, W – width.

| Status | Acc. no. | H (mm) | W (mm) | Whorls | Notes |
|---|---|---|---|---|---|
| Ht | NMK | 3.8 | 2.1 | 5.5 | |
| Pt 1 | NMK | 3.8 | 2.0 | 5.5 | Dissected |
| Pt 2 | NMW.Z. 2007.024.00007 | 3.8 | 2.0 | 5.5 | Dissected |
| Pt 3 | NMW.Z.2007.024.00008 | 3.8 | 2.1 | 5.5 | Dissected |
| Pt 4 | NMK | 3.8 | 2.1 | 5.5 | Dissected |
| Pt 5 | NMK | 3.9 | 2.1 | 5.5 | Dissected, subadult |
| Pt 6 | NMK | 3.6 | 2.2 | 5.5 | |
| Pt 7 | NMW.Z. 2007.024.00009 | 3.9 | 2.2 | 5.5 | |
| Pt 8 | NMT | 3.8 | 2.1 | 5.5 | |
| Pt 9 | NMW.Z. 2007.024.00010 | 2.0 | 2.0 | 3.5 | Empty juvenile shell, broken |

attaching to apical part of penis and to vas deferens near the entry point and thus effectively bifid. Penial retractor originating from the free muscle system and not from the body wall. Interior surface of penis (Fig. 15) consisting of soft structures and chitinous hooks (some highly modified) as follows. Apical part of penis: slightly constricted, with a single large (about 0.35 mm long), spatulate yellow-brown modified hook, its base embedded in fibres of penial retractor and projecting beyond constriction into main lumen of penis, with a row of thin extensions at its tip. This is flanked by two large (about 0.25 mm long) bifid yellow-brown hooks attached by very narrow bases. Main part of penis: dominated by a single central longitudinal blade-like pilaster, flanked by incomplete transverse ridges or septae and a single row of low, irregularly shaped pads bearing simple yellow-brown triangular hooks that vary little in size and shape (about 0.05 mm long). Basal part of penis: longitudinal pilaster, pads and septae interrupted, resulting in a more irregular surface, structures becoming very indistinct towards atrium. Total number of hooks in penis: 31. Albumen gland moderately sized and with a uniform structure of small and indistinct vesicles or acini. Hermaphroditic duct diverticulum (talon) enlarged, simple and not convoluted, not hidden within albumen gland. Bursa copulatrix (= gametolytic sac or spermatheca) small, ovoid, apparently empty, and attending albumen gland. Acini of oviductal gland elongate, flattened, large and distinct. Acini of prostate very indistinct. Vagina and atrium short, little muscularised.

Holotype: KENYA: Taita Hills, Macha Forest Reserve (3°27'S:38°22'E), leaf litter in indigenous forest at 1550 m altitude (site IB), leg. C.N. Lange, 27.ix.1998 (NMK).

Paratypes: Collection data for all paratypes same as holotype; all specimens except paratype 5 and paratype 9 are live-collected adults (Table 2).

Other material examined: 9 additional specimens, as follows: KENYA: Taita Hills: 1 adult, Macha Forest Reserve (3°27'S:38°22'E), leaf litter in indigenous forest at 1550 m altitude, leg. C.N. Lange, 27.ix.1998; 1 adult, Ndiwenyi Forest Reserve (3°26'S:38°21'E), leaf litter in indigenous forest at 1580 m altitude, leg. C.N. Lange, 26.ix.1998; 6 adults, Yale Forest Reserve (3°24'S:38°18'E), leaf litter in indigenous forest at 1900 m altitude, leg. C.N. Lange, 29.ix.1998; 1 adult, Fururu Forest Reserve (3°24'S:38°20'E), leaf litter in indigenous forest at 1400 m altitude, leg. C.N. Lange, 26.ix.1998 (NMK).

Remarks: Comments made under *G. ndiwenyiensis* regarding generic placement also apply. Shell shape and dentition immediately suggest an affinity with certain other

African *Gulella*, in particular *G. radius* (Preston, 1910) of the Shimba Hills and coastal Kenya and Tanzania. The Malawian *G. meridithae* van Bruggen, 2000, the Comoran *G. miniuscula* (Morelet, 1877) and the South African–Mozambican *G. browni* van Bruggen, 1969 share with *G. nictitans* the biconical shell shape and coarse pattern of apertural dentition and may prove to form a monophyletic group. The Tanzanian *G. cuspidata* Verdcourt, 1963 might also be referrable to this group, but has more complex dentition than the aforementioned species. Assuming the features shared by all these species are in some way indicative of phylogenetic relatedness, we consider *G. nictitans* to be a northerly, endemic representative of a group otherwise distributed widely from eastern to south-eastern Africa, and possibly also on Comoros. Certain other land snail groups or taxa, including some streptaxids, have comparable distributions (Herbert & Kilburn 2004; Rowson in press; Verdcourt 2000) but none has yet been reported from the Taita Hills.

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